

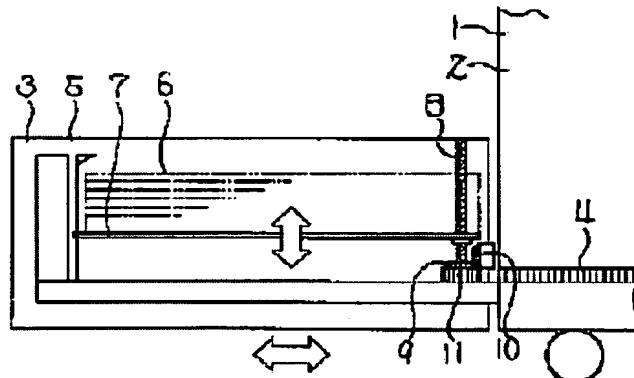
PAPER FEEDING DEVICE

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Abstract of JP8282862

PURPOSE: To enhance the operability and working efficiency when paper sheets are supplied by lowering a bottom plate for stacking paper sheets in the process of drawing a paper feed tray. **CONSTITUTION:** A drawable paper feed tray 3 has a bottom plate 7 for putting paper sheets 6, which can be raised and lowered; a feed screw 8 having a driven gear 9, which is screwed to a bottom plate 7; a rotor 11 rotated interlockingly with the drawing and inserting operation of the paper feed tray 3 from an image forming device body 2; and a one-way rotation transmitting means for transmitting only the one-way rotating motion of the rotor 11, and the image forming device body 2 has a driving means for driving the driven gear 9. Thus, the rotation of the rotor 11 is transmitted to the feed screw 8 to lower the bottom plate 7 to the bottom position by a simple operation of only drawing the paper feed tray 3, and in the state where the paper feed tray 3 is installed on the image forming device body 2, the feed screw 8 is driven to raise the bottom plate 7.



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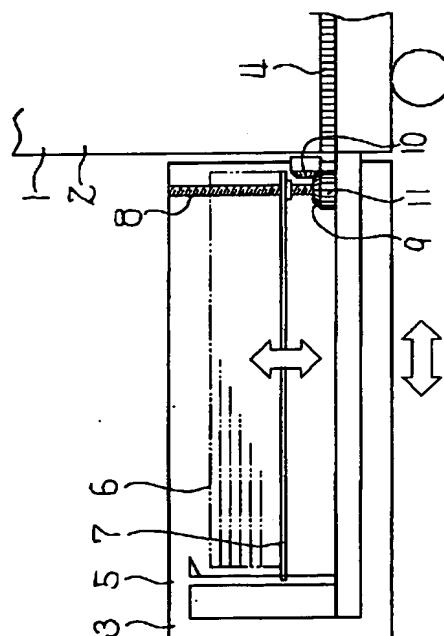
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(54)【発明の名称】給紙装置

(57)【要約】

【目的】給紙トレーを引き出す過程で紙葉を積載する底板を下降させることにより、紙葉補給時の操作性及び作業能率を高める。

【構成】引出自在の給紙トレー3に、紙葉6を積載する昇降自在の底板7と、従動ギヤ9を有して底板7に螺合された送りネジ8と、画像形成装置本体2からの給紙トレー3の引出挿入動作に連動して回転する回転体11と、回転体11の一方向の回転運動のみを送りネジ8に伝達する一方向回転伝達手段とを設け、画像形成装置本体2には従動ギヤ9を駆動手段を設けた。これにより、給紙トレー3を引き出すだけの容易な操作で、回転体11の回転を送りネジ8に伝達して底板7を最下降位置に下降させ、給紙トレー3を画像形成装置本体2に装着した状態では、駆動手段により送りネジ8を駆動して底板7を上昇させる。



【特許請求の範囲】

【請求項 1】 画像形成装置本体に引出自在に収納される給紙トレーと、この給紙トレーの内部に昇降自在に設けられて多数枚の紙葉を積載する底板と、前記給紙トレーの内部に回転自在に設けられるとともに一部に従動ギヤを一体に有して前記底板に垂直に螺合された送りネジと、前記給紙トレーに設けられ前記画像形成装置本体に対する前記給紙トレーの引出挿入動作に連動して回転する回転体と、前記給紙トレーの引出動作に伴う前記回転体の一方向の回転力のみを前記底板を下降させるための回転力として前記送りネジに伝達する一方向回転伝達手段と、前記画像形成装置本体に設けられるとともに前記従動ギヤを駆動する駆動ギヤを含む駆動手段とを具備したことを特徴とする給紙装置。

【請求項 2】 画像形成装置本体に給紙トレーの引出挿入方向に沿うラックを設け、回転体として前記ラック上を転動する転動ギヤを用いたことを特徴とする請求項 1 記載の給紙装置。

【請求項 3】 送りネジと回転体とを連結する一方向回転伝達手段はトルクリミッタを備えていることを特徴とする請求項 1 又は 2 記載の給紙装置。

【請求項 4】 駆動ギヤを含む駆動手段は、一方向の回転で給紙トレーの底板上に積載された最上層の紙葉に接触する給紙ローラを給紙方向に駆動し、他方向の回転で前記底板を上昇させる方向に前記駆動ギヤを駆動する正逆回転自在の給紙モータを駆動源とすることを特徴とする請求項 1, 2 又は 3 記載の給紙装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、複写機、プリンタ等の画像形成装置に用いられ、給紙トレーに収納された紙葉を最上層のものから順次給紙する給紙装置に関する。

【0002】

【従来の技術】 この種の給紙装置では、給紙トレー内に積載された紙葉を上方に押し上げて最上層の紙葉を給紙ローラに圧接し、この状態で給紙ローラを駆動することにより紙葉を一枚ずつ引き出している。最上層の紙葉を給紙ローラに圧接するために、特開昭 63-267620 号公報に開示されているものに代表されるようにバネを利用した給紙装置では、積載された紙葉の大きさの違いや、積載量によってバネの圧力が変化してしまう。つまり、例えば 250 枚の紙葉を積載した初期時の状態と、積載した紙葉を使いきる寸前のときの状態とでは、紙葉を押し上げる距離が異なるためバネの圧力が変化する。紙葉の重量が順次減少する変化とバネの圧力の変化とが、常時釣り合っていれば問題はないが、一般には、常時使用される全ての紙葉のサイズや紙種に対応して適正な圧力が得られるバネを設計することは困難である。ここで、特開昭 63-267620 号公報に開示されているように、バネの圧力をユーザが調整しなければなら

ないという問題がある。

【0003】 また、近年では、給紙トレー内に積載し得る紙葉の量を増やして欲しいという要望が強く、500 枚、1000 枚もの大量の紙葉を積載する必要が増している。この場合、紙葉を押し上げる距離が長くなるために、前述のように、給紙ローラに紙葉をバネ圧で圧接させる場合の問題は更に深刻化してきている。そこで、積載枚数を増やした場合には、底板上に積載された最上層の紙葉が一定の高さになるように、底板を順次上昇させるエレベータ方式の給紙装置が用いられている。

【0004】

【発明が解決しようとする課題】 エレベータ方式の給紙装置では、紙葉を補給する場合に、スイッチ操作によりモータを駆動して底板を最下降位置まで下降させ、給紙トレーを引き出すという煩わしい操作をユーザに強いることになる。さらに、大容量の紙葉を積載する底板を最下降位置まで下降させるまで待たなければならず、紙葉の補給に際して時間がかかる。

【0005】

【課題を解決するための手段】 請求項 1 記載の発明は、画像形成装置本体に引出自在に収納される給紙トレーと、この給紙トレーの内部に昇降自在に設けられて多数枚の紙葉を積載する底板と、前記給紙トレーの内部に回転自在に設けられるとともに一部に従動ギヤを一体に有して前記底板に垂直に螺合された送りネジと、前記給紙トレーに設けられ前記画像形成装置本体に対する前記給紙トレーの引出挿入動作に連動して回転する回転体と、前記給紙トレーの引出動作に伴う前記回転体の一方向の回転力のみを前記底板を下降させるための回転力として前記送りネジに伝達する一方向回転伝達手段と、前記画像形成装置本体に設けられるとともに前記従動ギヤを駆動する駆動ギヤを含む駆動手段とを具備した給紙装置である。

【0006】 請求項 2 記載の発明は、画像形成装置本体に給紙トレーの引出挿入方向に沿うラックを設け、回転体として前記ラック上を転動する転動ギヤを用いた給紙装置である。

【0007】 請求項 3 記載の発明は、請求項 1 又は 2 記載の発明において、送りネジと回転体とを連結する一方向回転伝達手段はトルクリミッタを備えている給紙装置である。

【0008】 請求項 4 記載の発明は、請求項 1, 2 又は 3 記載の発明において、駆動ギヤを含む駆動手段は、一方向の回転で給紙トレーの底板上に積載された最上層の紙葉に接触する給紙ローラを給紙方向に駆動し、他方向の回転で前記底板を上昇させる方向に前記駆動ギヤを駆動する正逆回転自在の給紙モータを駆動源とする給紙装置である。

【0009】

【作用】 請求項 1 記載の発明によれば、画像形成装置本

体からの給紙トレーの引出動作に連動する回転体の一方への回転力は、一方向回転伝達手段により送りネジに伝達されるため、この送りネジが螺合された底板が下降する。画像形成装置本体への給紙トレーの挿入動作に連動する回転体の他方向への回転力は、送りネジには伝達されないため、底板は下降時の位置を維持する。画像形成装置本体に給紙トレーを挿入した状態で駆動手段を駆動すると、この駆動手段の駆動ギヤが送りネジに一体に形成した従動ギヤを回転させるため、底板を上昇させることが可能となる。

【0010】請求項2記載の発明によれば、回転体として、画像形成装置本体に設けたラック上を転動する転動ギヤを用いたので、給紙トレーの引出動作に対して回転体を確実に追従回転させ、底板を最下降位置まで確実に下降させることが可能となる。

【0011】請求項3記載の発明によれば、送りネジと回転体とを連結する一方向回転伝達手段はトルクリミッタを備えているため、給紙トレーを途中まで引き出した時点で底板が最下降位置に達した場合には、なおも回転する回転体と送りネジとの間が動力遮断状態に維持される。

【0012】請求項4記載の発明によれば、送りネジの従動ギヤを駆動する駆動ギヤを含む駆動手段は、一方向の回転で給紙ローラを給紙方向に駆動し、他方向の回転で底板を上昇させる方向に駆動ギヤを回転させる正逆回転自在の給紙モータを駆動源とするため、給紙ローラを駆動する給紙ローラを利用して底板を上昇させることが可能となる。

【0013】

【実施例】本発明の一実施例を図面に基づいて説明する。図1に示すように、例えば、複写機等の画像形成装置1と、この画像形成装置1の画像形成装置本体2に引出自在に挿入される給紙トレー3とが設けられている。画像形成装置本体2の片側の内側面には、給紙トレー3の引出挿入方向に沿ってラック4が設けられている。給紙トレー3は上面が開放されたケース5を有し、このケース5には、多数枚の紙葉6を積載する底板7が昇降自在に設けられている。図示しないが、ケース5の内面には、底板7を水平の姿勢で昇降させるために少なくとも底板7の両側を案内するガイドが設けられている。

【0014】また、前記紙葉6の積載範囲外となる前記底板7の一部には雌ネジ(図示せず)が形成され、この雌ネジには、給紙トレー3に垂直な姿勢で回転自在に保持された送りネジ8が螺合されている。この送りネジ8の底板7より下側の一部には従動ギヤ9が一体に形成され、この従動ギヤ9に常時噛合された伝動ギヤ10が前記ケース5の一部に回転自在に保持されている。なお、従動ギヤ9と伝動ギヤ10とはペベルギヤを用いているが、ペベルギヤに限られるものではない。さらに、ケース5の下方には、送りネジ8の軸心上に配置された回転

体としての転動ギヤ11が回転自在に設けられている。この転動ギヤ11の外周の一部は、前記ラック4に噛合するように前記ケース5の側方から突出されている。

【0015】図2に示すように、給紙トレー3を画像形成装置本体2に最後まで挿入した状態では、前記転動ギヤ11は前記ラック4から外れて自由回転自在である。また、図3に示すように、転動ギヤ11と前記送りネジ8とは、トルクリミッタ(図示せず)を備えた一方向回転伝達手段12により連結されている。この一方向回転伝達手段12は、画像形成装置本体2からの給紙トレー3の引出動作に伴う前記転動ギヤ11の一方向の回転運動のみを前記送りネジ8に伝達して前記底板7を下降させるように構成されている。

【0016】具体的には、図2において、送りネジ8のネジは左ネジであり、転動ギヤ11が矢印方向(時計方向)に回転したときに、一方向回転伝達手段12が転動ギヤ11の回転を送りネジ8に伝え、この送りネジ8の回転により底板7が下降する構造となっている。さらに、画像形成装置本体2には、給紙トレー3を最後まで挿入したときに、前記伝動ギヤ10が同軸上で連結される伝動ギヤ13が回転自在に設けられている。

【0017】次に、前記画像形成装置本体2に設けられた駆動手段の構成を図4の平面図及び図5の縦断側面図に示す。この駆動手段14は、正逆回転自在の給紙モータ15を駆動源とする。この給紙モータ15の回転軸16の中間部には、モータギヤ17が固定的に嵌合され、回転軸16の先端にはトルクリミッタ18を介して揺動アーム19が揺動自在に連結されている。この揺動アーム19の自由端側にはモータギヤ17に常時噛合された遊星ギヤ20が支軸21を介して回転自在に保持され、この揺動アーム19の両側には、支軸21に当接して揺動アーム19の揺動範囲を規制するストッパ22, 23と、遊星ギヤ20に噛合される駆動ギヤ24, 25とが配列されている。一方の駆動ギヤ24は、給紙ローラ(図示せず)に連結され、他方の駆動ギヤ25は、ギヤ列(図示せず)を介して前記伝動ギヤ13に連結されている。

【0018】このような構成において、図6(a)及び図7(a)に示す状態は、給紙トレー3が画像形成装置本体2に収納された状態で、給紙トレー3内の紙葉(紙葉については図1の紙葉6を参照)を使いきった状態である。この状態に至るまでは、給紙の進行とともに給紙トレー3の底板7を順次上昇させているため、この状態では底板7は最上昇位置に達している。

【0019】給紙トレー3に紙葉を補給する場合には、図6(b) (c)に示すように、画像形成装置本体2から給紙トレー3を引き出すと、転動ギヤ11がラック4上を時計方向(図3の矢印方向)に回転する。この回転は一方向回転伝達手段12により送りネジ8に伝達され、図7(b)に示すように送りネジ8の回転により底

板7が下降し、画像形成装置本体2から給紙トレー3を完全に引き出した状態では、図7(c)に示すように底板7は最下降位置に下降する。

【0020】これまでの説明は、最上昇位置に位置する底板7を下降させる場合であるが、底板7上に紙葉が残っている状態では、底板7は最上昇位置よりも下位に位置する。この状態で給紙トレー3を画像形成装置本体2の外に完全に引き出すと、その引出途中で底板7が最下降位置に達するが、この場合には、一方向回転伝達手段12がトルクリミッタを有しているため、転動ギヤ11のみが回転する。したがって、底板7や送りネジ8に異常な力がかかることはない。

【0021】以上のように、画像形成装置本体2から給紙トレー3を引き出す過程で、底板7を最下降位置に下降させることができるために、操作が容易であり、また、給紙トレー3を引き出したときには、既に底板7が最下降位置に下降しているため、直ちに紙葉を補給することができる。

【0022】この場合、画像形成装置本体2に給紙トレー3の引出挿入方向に沿うラック4を設け、このラック4上を転動する転動ギヤ11を回転体として用いたので、給紙トレー3の引出動作に対して転動ギヤ11を確実に追従回転させることができるとなる。これにより、底板7を最下降位置まで確実に下降させることができる。また、回転体としてスプロケットホイールを用い、このスプロケットホイールに係合するチェンを、給紙トレー3の引出挿入方向に沿わせて画像形成装置本体2に張設しても、略同様の動作を行なわせることができるとなる。

【0023】図1に示すように、引き出した給紙トレー3底板7上に紙葉6を積載した後に、給紙トレー3を画像形成装置本体2に挿入する過程では、前述の動作とは逆に転動ギヤ11が反時計方向に回転するが、この反時計方向の回転は送りネジ8には伝達されない。これは一方向回転伝達手段12の作用である。したがって、底板7を最下降位置に位置させた状態のまま、給紙トレー3が画像形成装置本体2に挿入される。この挿入状態では、転動ギヤ10, 13が同軸上で連結される。

【0024】次に、駆動手段14の動作について説明する。図4において、給紙モータ15を駆動すると、モータギヤ17が回転するとともに、トルクリミッタ18を介して回転軸16の回転を受ける搖動アーム19が回転軸16を中心に搖動するが、支軸21の先端がストッパ22又は23に当接した時点で静止する。なおも給紙モータ15が回転するが、回転軸16と搖動アーム19とはトルクリミッタ18を介して連結されているため、搖動アーム19とストッパ22, 23とに無理な力がかかることはない。

【0025】給紙トレー3の底板7を上昇させることは、給紙モータ15を図4において時計方向(実線矢印方向)に駆動する。これにより、モータギヤ17が時計

方向に回転し、搖動アーム19がストッパ23側に回動して静止し、この状態でモータギヤ17の回転が遊星ギヤ20を介して駆動ギヤ25に伝達される。駆動ギヤ25の回転はギヤ列を介して伝動ギヤ13に伝達され、さらに、伝動ギヤ13から伝動ギヤ10を介して従動ギヤ9に伝達され、送りネジ8は従動ギヤ9と一緒に回転する。その回転方向は、図3において反時計方向(矢印方向と反対方向)であり、底板7が上昇する。底板7上の最上層の紙葉が給紙ローラに圧接される一定の高さに達すると、その最上層の紙葉の位置を検出する紙葉検出器(図示せず)の検出信号により給紙モータ15が停止するため、底板7も一定の高さで停止する。

【0026】そして、給紙命令が出力されると、図4において、給紙モータ15が反時計方向(点線矢印方向)に回転する。この場合には、搖動アーム19は支軸21がストッパ22に当接するまで搖動し、モータギヤ17の反時計方向への回転が遊星ギヤ20から駆動ギヤ24に伝達される。この駆動ギヤ24の回転は給紙ローラに伝達されるため、底板7上の最上層の紙葉が給紙ローラにより引き出される。このようにして、給紙動作が続行されると、紙葉検出器がオフとなるため、給紙モータ15を時計方向に駆動し、前述したように、底板7を一定の高さまで上昇させる動作が繰り返される。

【0027】以上のように、給紙ローラを駆動する給紙モータ15を利用して給紙トレー3の底板7を上昇させることができるために、構造を簡略化し、コストダウンを図ることができる。

【0028】なお、給紙モータ15の一方向の回転を給紙ローラに伝達し、他方向の回転を送りネジ8に伝達する場合に、動力伝達経路を搖動アーム19の搖動動作により切り替るように構造を用いたが、正逆回転自在の給紙モータ15に駆動されるギヤ列に、それぞれ回転伝達方向が異なる二つのワンウェイクラッチを設け、給紙モータ15の一方向の回転を一方のワンウェイクラッチを介して給紙ローラに伝達し、給紙モータ15の他方向の回転を他方のワンウェイクラッチを介して送りネジ8に伝達するようにしてよい。

【0029】

【発明の効果】請求項1記載の発明によれば、画像形成装置本体に引出自在に収納される給紙トレーに、多数枚の紙葉を積載する昇降自在の底板と、一部に従動ギヤを有して前記底板に垂直に螺合された送りネジと、前記給紙トレーの引出挿入動作に連動して回転する回転体と、前記給紙トレーの引出動作に伴う前記回転体の一方向の回転力を前記底板を下降させるための回転力として前記送りネジに伝達する一方向回転伝達手段とを設け、前記画像形成装置本体に前記従動ギヤを駆動する駆動ギヤを含む駆動手段を設けたので、画像形成装置本体からの給紙トレーの引出動作に連動する回転体の一方向への回転力は、一方向回転伝達手段により送りネジに伝達される

ため、送りネジが螺合された底板を下降させることができる。また、画像形成装置本体への給紙トレーの挿入動作に連動する回転体の他方向への回転力は送りネジには伝達されないため、画像形成装置本体に給紙トレーを挿入した状態では、底板を最下降位置に位置させ、駆動手段により送りネジを回転させて底板を上昇させることができる。したがって、給紙トレーを引き出すだけの容易な操作で底板を最下降位置に下降させることができ、また、給紙トレーを引き出すと同時に紙葉の補給作業に移行し得るため、紙葉の補給を短時間で行なうことができる。

【0030】請求項2記載の発明によれば、回転体として、画像形成装置本体に設けたラック上を転動する転動ギヤを用いたので、給紙トレーの引出動作に対して回転体を確実に追従回転させ、底板を最下降位置まで確実に下降させることができる。

【0031】請求項3記載の発明によれば、送りネジと回転体とを連結する一方向回転伝達手段はトルクリミッタを備えているため、給紙トレーを途中まで引き出した時点では底板が最下降位置に達した場合には、なおも回転する回転体と送りネジとの間を動力遮断状態に維持することができる。これにより、底板や送りネジに異常な力がかかることにより故障を未然に防止することができる。

【0032】請求項4記載の発明によれば、送りネジの従動ギヤを駆動する駆動ギヤを含む駆動手段は、一方向の回転で給紙ローラを給紙方向に駆動し、他方向の回転で底板を上昇させる方向に駆動ギヤを回転させる正逆回転自在の給紙モータを駆動源とするため、給紙ローラを

駆動する給紙モータを利用して底板を上昇させることができ、これにより、構造の簡略化及びコストダウンを図ることができる。

【図面の簡単な説明】

【図1】本発明の一実施例を示す縦断側面図である。

【図2】送りネジの従動ギヤ及び転動ギヤの駆動構造を示す一部の水平断面図である。

【図3】送りネジの従動ギヤの駆動構造を示す一部の縦断側面図である。

10 【図4】駆動手段を示す平面図である。

【図5】駆動手段を示す縦断側面図である。

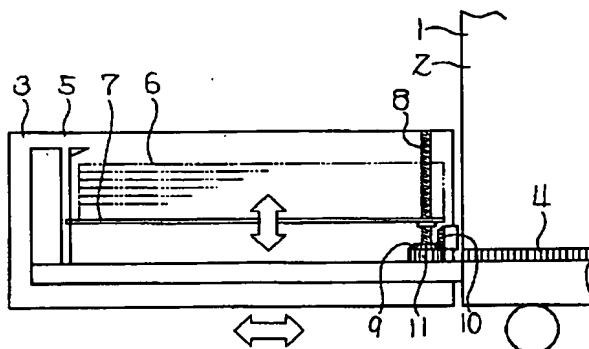
【図6】画像形成装置本体からの給紙トレーの引出動作を示す水平断面図である。

【図7】給紙トレーの引出動作に伴う底板の下降動作を示す縦断側面図である。

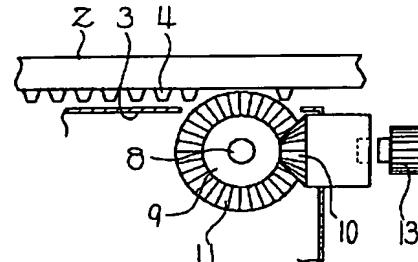
【符号の説明】

2	画像形成装置本体
3	給紙トレー
4	ラック
20	紙葉
6	底板
7	送りネジ
8	従動ギヤ
9	回転体、転動ギヤ
11	一方向回転伝達手段
12	駆動手段
14	給紙モータ
25	駆動ギヤ

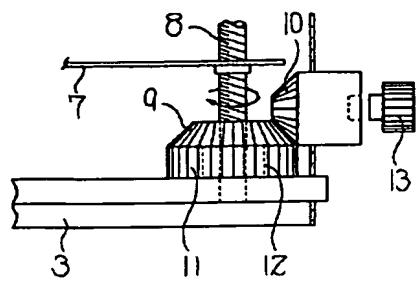
【図1】



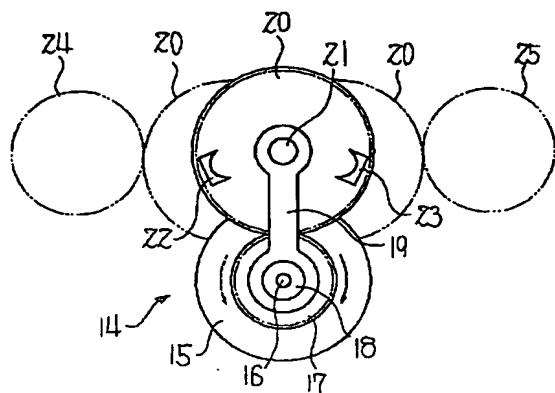
【図2】



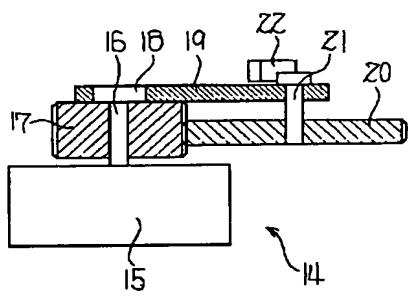
【図 3】



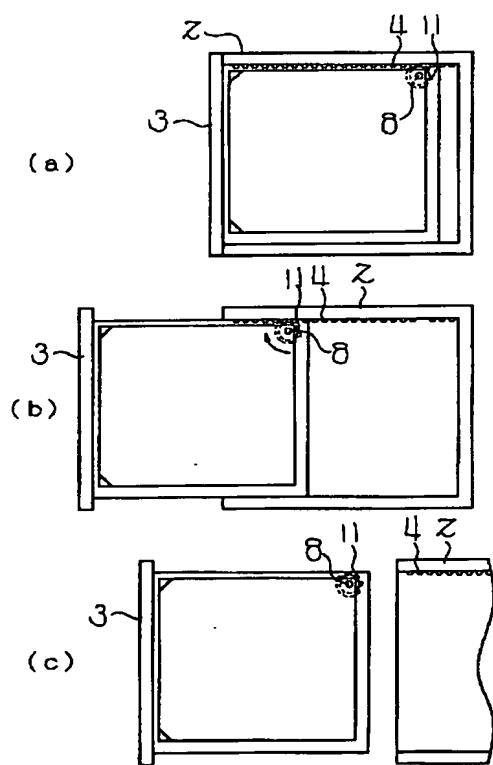
【図 4】



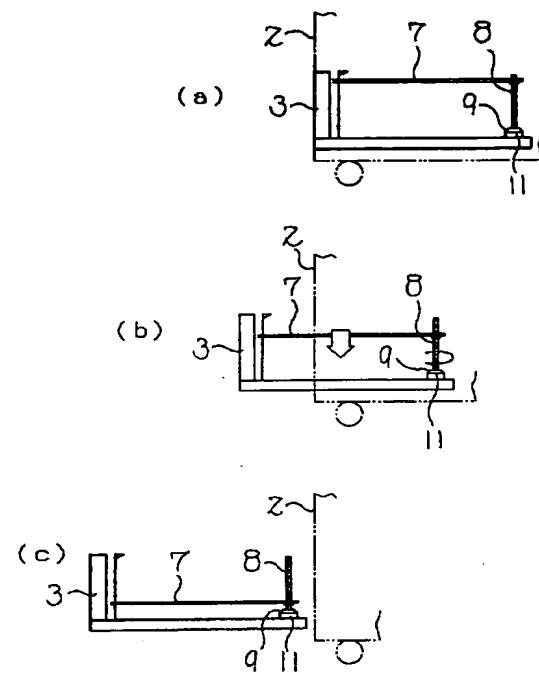
【図 5】



【図 6】



【図 7】



PATENT ABSTRACTS OF JAPAN

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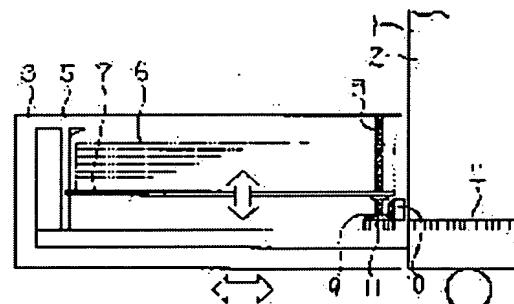
(72) Inventor : KURETANI ETSUROU

(54) PAPER FEEDING DEVICE

(57) Abstract:

PURPOSE: To enhance the operability and working efficiency when paper sheets are supplied by lowering a bottom plate for stacking paper sheets in the process of drawing a paper feed tray.

CONSTITUTION: A drawable paper feed tray 3 has a bottom plate 7 for putting paper sheets 6, which can be raised and lowered; a feed screw 8 having a driven gear 9, which is screwed to a bottom plate 7; a rotor 11 rotated interlockingly with the drawing and inserting operation of the paper feed tray 3 from an image forming device body 2; and a one-way rotation transmitting means for transmitting only the one-way rotating motion of the rotor 11, and the image forming device body 2 has a driving means for driving the driven gear 9. Thus, the rotation of the rotor 11 is transmitted to the feed screw 8 to lower the bottom plate 7 to the bottom position by a simple operation of only drawing the paper feed tray 3, and in the state where the paper feed tray 3 is installed on the image forming device body 2, the feed screw 8 is driven to raise the bottom plate 7.



LEGAL STATUS

[Date of request for examination]

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[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

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CLAIMS

[Claim(s)]

[Claim 1] it prepares in the interior of the paper tray contained free [a drawer] by the body of image formation equipment, and this paper tray free [rise and fall] -- having -- many -- with the bottom plate loading the paper leaf of several sheets The delivery screw which has a follower gear in one and was screwed in the part at right angles to said bottom plate while being prepared in the interior of said paper tray free [rotation], The body of revolution which is prepared in said paper tray, is interlocked with drawer insertion actuation of said paper tray to said body of image formation equipment, and is rotated, The one direction rotation means of communication which transmits only the turning effort of the one direction of said body of revolution accompanying drawer actuation of said paper tray to said delivery screw as a turning effort for dropping said bottom plate, Feed equipment characterized by providing the driving means containing the drive gear which drives said follower gear while being prepared in said body of image formation equipment.

[Claim 2] Feed equipment according to claim 1 characterized by using the rolling gear which prepares the rack along the drawer path of insertion of a paper tray in the body of image formation equipment, and rolls said rack top as body of revolution.

[Claim 3] The one direction rotation means of communication which connects a delivery screw and body of revolution is feed equipment according to claim 1 or 2 characterized by having the torque limiter.

[Claim 4] The driving means containing a drive gear is feed equipment according to claim 1, 2, or 3 characterized by making into a driving source the feed motor which drives the feed roller in contact with the paper leaf of the maximum upper layer loaded on the bottom plate of a paper tray by rotation of an one direction in the feed direction, and drives said drive gear in the direction which raises said bottom plate by rotation of the other directions, and in which forward inverse rotation is free.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is used for image formation equipments, such as a copying machine and a printer, and relates to the feed equipment which carries out sequential feeding of the paper leaf contained by the paper tray from the thing of the maximum upper layer.

[0002]

[Description of the Prior Art] With this kind of feed equipment, the paper leaf loaded in the paper tray is pushed up up, the pressure welding of the paper leaf of the maximum upper layer is carried out to a feed roller, and it is pulling out one paper leaf at a time by driving a feed roller in this condition. In order to carry out the pressure welding of the paper leaf of the maximum upper layer to a feed roller, the pressure of a spring will change with the difference in the magnitude of the loaded paper leaf, and burden with the feed equipment which used the spring so that it might be represented by what is indicated by JP,63-267620,A. In the condition at the time of the first stage which was got blocked, for example, loaded the paper leaf of 250 sheets, and the condition at the time just before exhausting the loaded paper leaf, since the distance which pushes up paper leaf differs, the pressure of a spring changes. Although a problem will not have change in which the weight of paper leaf carries out sequential reduction, and change of the pressure of a spring if they always balance, it is difficult to design the spring with which a proper pressure is generally obtained corresponding to the size and the paper type of all paper leaf which are always used. Here, there is a problem that a user has to adjust the pressure of a spring as indicated by JP,63-267620,A.

[0003] Moreover, in recent years, the request of wanting you to increase the amount of the paper leaf which can be loaded in a paper tray is strong, and the need of loading a lot of paper leaf of 500 sheets and no less than 1000 sheets is increasing. In this case, since the distance which pushes up paper leaf becomes long, the problem in the case of carrying out the pressure welding of the paper leaf to a feed roller with spring pressure is aggravated further as mentioned above. So, when loading number of sheets is increased, the feed equipment of the elevator method which carries out the sequential rise of the bottom plate is used so that the paper leaf of the maximum upper layer loaded on the bottom plate may become fixed height.

[0004]

[Problem(s) to be Solved by the Invention] With the feed equipment of an elevator method, when supplying paper leaf, a motor will be driven by switch actuation, a bottom plate will be dropped to the maximum downward location, and troublesome actuation of pulling out a paper tray will be forced upon a user. Furthermore, it must wait until it drops the bottom plate loading mass paper leaf to the maximum downward location, and on the occasion of supply of paper leaf, it takes time amount.

[0005]

[Means for Solving the Problem] The paper tray by which invention according to claim 1 is contained free [a drawer] by the body of image formation equipment, it prepares in the interior of this paper tray free [rise and fall] -- having -- many -- with the bottom plate loading the paper leaf of several sheets The delivery screw which has a follower gear in one and was screwed in the part at right angles to said bottom plate while being prepared in the interior of said paper tray free [rotation], The body of revolution which is prepared in said paper tray, is interlocked with drawer

insertion actuation of said paper tray to said body of image formation equipment, and is rotated, The one direction rotation means of communication which transmits only the turning effort of the one direction of said body of revolution accompanying drawer actuation of said paper tray to said delivery screw as a turning effort for dropping said bottom plate, While being prepared in said body of image formation equipment, it is feed equipment possessing the driving means containing the drive gear which drives said follower gear.

[0006] Invention according to claim 2 is feed equipment using the rolling gear which prepares the rack along the drawer path of insertion of a paper tray in the body of image formation equipment, and rolls said rack top as body of revolution.

[0007] The one direction rotation means of communication with which invention according to claim 3 connects a delivery screw and body of revolution in invention according to claim 1 or 2 is feed equipment equipped with the torque limiter.

[0008] The driving means in which invention according to claim 4 contains a drive gear in invention according to claim 1, 2, or 3 is feed equipment which makes a driving source the feed motor which drives the feed roller in contact with the paper leaf of the maximum upper layer loaded on the bottom plate of a paper tray by rotation of an one direction in the feed direction, and drives said drive gear in the direction which raises said bottom plate by rotation of the other directions, and in which forward inverse rotation is free.

[0009]

[Function] According to invention according to claim 1, since the turning effort to the one direction of the body of revolution interlocked with drawer actuation of the paper tray from the body of image formation equipment is transmitted to a delivery screw by the one direction rotation means of communication, the bottom plate in which this delivery screw was screwed descends. Since the turning effort to the other directions of the body of revolution interlocked with insertion actuation of the paper tray to the body of image formation equipment is not transmitted to a delivery screw, a bottom plate maintains the location at the time of descent. Where a paper tray is inserted in the body of image formation equipment, when a driving means is driven, in order that the drive gear of this driving means may make a delivery screw rotate the follower gear formed in one, it becomes possible to raise a bottom plate.

[0010] Since the rolling gear which rolls the rack top prepared in the body of image formation equipment as body of revolution was used according to invention according to claim 2, flattery rotation of the body of revolution is certainly carried out to drawer actuation of a paper tray, and it becomes possible to drop a bottom plate certainly to the maximum downward location.

[0011] According to invention according to claim 3, since the one direction rotation means of communication which connects a delivery screw and body of revolution is equipped with the torque limiter, when the paper tray was pulled out to the middle and a bottom plate arrives at the maximum downward location, between the body of revolution and the delivery screws which rotate still more is maintained by the power cut off state.

[0012] In order to make into a driving source the feed motor which rotates a drive gear in the direction which the driving means containing the drive gear which drives the follower gear of a delivery screw drives [direction] a feed roller in the feed direction by rotation of an one direction, and raises a bottom plate by rotation of the other directions and in which forward inverse rotation is free according to invention according to claim 4, it becomes that it is possible in raising a bottom plate using the feed roller which drives a feed roller.

[0013]

[Example] One example of this invention is explained based on a drawing. As shown in drawing 1 , the image formation equipments 1, such as a copying machine, and the paper tray 3 inserted in the body 2 of image formation equipment of this image formation equipment 1 free [a drawer] are formed. The rack 4 is formed in the medial surface of one side of the body 2 of image formation equipment along the drawer path of insertion of a paper tray 3. the case 5 where, as for the paper tray 3, the top face was opened wide -- having -- this case 5 -- many -- the bottom plate 7 loading the paper leaf 6 of several sheets is formed free [rise and fall]. Although not illustrated, in order to make the inside of a case 5 go up and down a bottom plate 7 with a level posture, the guide which shows the both sides of a bottom plate 7 at least is prepared in it.

[0014] moreover, loading of said paper leaf 6 -- a female screw (not shown) is formed in said a part of bottom plate 7 which becomes out of range, and the delivery screw 8 held free [rotation] with the posture perpendicular to a paper tray 3 is screwed in it by this female screw. The follower gear 9 is formed at one below [a part of] the bottom plate 7 of this delivery screw 8, and the transmission gear 10 which always geared on this follower gear 9 is held free [rotation in said some of cases 5]. In addition, although the follower gear 9 and the transmission gear 10 use the bevel gear, they are not restricted to a bevel gear. Furthermore, under the case 5, the rolling gear 11 as body of revolution arranged on the axial center of the delivery screw 8 is formed free [rotation]. A part of periphery of this rolling gear 11 is projected from the side of said case 5 so that it may gear on said rack 4.

[0015] As shown in drawing 2 , where a paper tray 3 is inserted in the body 2 of image formation equipment to the last, it can be separated from said rolling gear 11 from said rack 4, and it can rotate freely. Moreover, as shown in drawing 3 , the rolling gear 11 and said delivery screw 8 are connected by the one direction rotation means of communication 12 equipped with the torque limiter (not shown). This one direction rotation means of communication 12 transmits only rotation of the one direction of said rolling gear 11 accompanying drawer actuation of the paper tray 3 from the body 2 of image formation equipment to said delivery screw 8, and it is constituted so that said bottom plate 7 may be dropped.

[0016] In drawing 2 , the screw of the delivery screw 8 is a left screw, and when the rolling gear 11 rotates in the direction of an arrow head (clockwise rotation), an one direction rotation means of communication 12 tells rotation of the rolling gear 11 to the delivery screw 8, and, specifically, it has the structure where a bottom plate 7 descends by rotation of this delivery screw 8. Furthermore, when a paper tray 3 is inserted to the last, the transmission gear 13 with which said transmission gear 10 is connected on the same axle is formed in the body 2 of image formation equipment free [rotation].

[0017] Next, the configuration of the driving means prepared in said body 2 of image formation equipment is shown in the top view of drawing 4 , and the vertical section side elevation of drawing 5 . This driving means 14 makes a driving source the feed motor 15 in which forward inverse rotation is free. Fitting of the motor gear 17 is carried out to the pars intermedia of the revolving shaft 16 of this feed motor 15 fixed, and the swinging arm 19 is connected with it free [rocking] through the torque limiter 18 at the tip of a revolving shaft 16. The planet gear 20 which always geared on the motor gear 17 at free one end of this swinging arm 19 is held free [rotation] through a pivot 21, and the stoppers 22 and 23 which regulate the rocking range of a swinging arm 19 in contact with a pivot 21, and the drive gears 24 and 25 which gear to a planet gear 20 are arranged by the both sides of this swinging arm 19. One drive gear 24 is connected with a feed roller (not shown), and the drive gear 25 of another side is connected with said transmission gear 13 through the gear train (not shown).

[0018] In such a configuration, the condition which shows in drawing 6 (a) and drawing 7 (a) is in the condition that the paper tray 3 was contained by the body 2 of image formation equipment, and is in the condition which exhausted the paper leaf in a paper tray 3 (see the paper leaf 6 of drawing 1 about paper leaf). In order to carry out the sequential rise of the bottom plate 7 of a paper tray 3 with advance of feeding until it results in this condition, in this condition, the bottom plate 7 has arrived at the maximum rise location.

[0019] If it pulls out a paper tray 3 from the body 2 of image formation equipment as shown in drawing 6 (b) and (c) in supplying paper leaf to a paper tray 3, the rolling gear 11 will rotate a rack 4 top clockwise (the direction of an arrow head of drawing 3). This rotation is transmitted to the delivery screw 8 by the one direction rotation means of communication 12, as shown in drawing 7 (b), a bottom plate 7 descends by rotation of the delivery screw 8, and where a paper tray 3 is completely pulled out from the body 2 of image formation equipment, as shown in drawing 7 (c), a bottom plate 7 descends to the maximum downward location.

[0020] Although old explanation is the case where the bottom plate 7 located in the maximum rise location is dropped, in the condition that paper leaf remains on the bottom plate 7, a bottom plate 7 is located in low order rather than the maximum rise location. If a paper tray 3 is completely pulled out besides the body 2 of image formation equipment in this condition, a bottom plate 7 will arrive at the maximum downward location in the middle of that drawer, but in this case, since an one direction

rotation means of communication 12 has the torque limiter, only the rolling gear 11 rotates. Therefore, the unusual force is not applied to a bottom plate 7 or the delivery screw 8.

[0021] As mentioned above, since the bottom plate 7 has already descended to the maximum downward location in the process which pulls out a paper tray 3 from the body 2 of image formation equipment when actuation is easy and a paper tray 3 is pulled out, since a bottom plate 7 can be dropped to the maximum downward location, paper leaf can be supplied immediately.

[0022] In this case, the rack 4 along the drawer path of insertion of a paper tray 3 is formed in the body 2 of image formation equipment, and since the rolling gear 11 rolling on this rack 4 top was used as body of revolution, it becomes possible to carry out flattery rotation of the rolling gear 11 certainly to drawer actuation of a paper tray 3. Thereby, a bottom plate 7 can be certainly dropped to the maximum downward location. Moreover, even if it makes the chain which engages with this sprocket wheel meet the drawer path of insertion of a paper tray 3 and stretches it on the body 2 of image formation equipment, using a sprocket wheel as body of revolution, it becomes possible to make the same actuation as abbreviation perform.

[0023] As shown in drawing 1, after loading paper leaf 6 on paper tray 3 pulled-out bottom plate 7, although the rolling gear 11 rotates counterclockwise conversely, in the process which inserts a paper tray 3 in the body 2 of image formation equipment, rotation of this counterclockwise rotation is not delivered the above-mentioned actuation to the delivery screw 8. This is an operation of an one direction rotation means of communication 12. Therefore, a paper tray 3 is inserted in the body 2 of image formation equipment with the condition of having located the bottom plate 7 in the maximum downward location. In the state of this insertion, the transmission gears 10 and 13 are connected on the same axle.

[0024] Next, actuation of a driving means 14 is explained. In drawing 4, if the feed motor 15 is driven, while the motor gear 17 rotates, the swinging arm 19 which receives rotation of a revolving shaft 16 through a torque limiter 18 will rock centering on a revolving shaft 16, but when the tip of a pivot 21 contacts a stopper 22 or 23, it is stood still. Although the feed motor 15 rotates still more, since the revolving shaft 16 and the swinging arm 19 are connected through the torque limiter 18, they do not require the force with a swinging arm 19 and stoppers 22 and 23 impossible for.

[0025] In raising the bottom plate 7 of a paper tray 3, in drawing 4, it drives the feed motor 15 clockwise (the direction of a continuous-line arrow head). By this, the motor gear 17 rotates clockwise, a swinging arm 19 rotates and stands it still to a stopper 23 side, and rotation of the motor gear 17 is transmitted to the drive gear 25 through a planet gear 20 in this condition. Rotation of the drive gear 25 is transmitted to the transmission gear 13 through a gear train, further, it is transmitted to the follower gear 9 through the transmission gear 10 from the transmission gear 13, and the delivery screw 8 rotates to the follower gear 9 and one. The hand of cut is a counterclockwise rotation (the direction of an arrow head, and opposite direction) in drawing 3, and a bottom plate 7 goes up. If the paper leaf of the maximum upper layer on a bottom plate 7 reaches the fixed height by which a pressure welding is carried out to a feed roller, since the feed motor 15 will stop by the detecting signal of a paper leaf detector (not shown) which detects the location of the paper leaf of the maximum upper layer, a bottom plate 7 is also stopped in fixed height.

[0026] And an output of a feed instruction rotates the feed motor 15 counterclockwise (the direction of a dotted-line arrow head) in drawing 4. In this case, a swinging arm 19 is rocked until a pivot 21 contacts a stopper 22, and the rotation to the counterclockwise rotation of the motor gear 17 is transmitted to the drive gear 24 from a planet gear 20. Since rotation of this drive gear 24 is transmitted to a feed roller, the paper leaf of the maximum upper layer on a bottom plate 7 is drawn out by the feed roller. Thus, if feed actuation is continued, since a paper leaf detector will become off, as the feed motor 15 is driven clockwise and mentioned above, the actuation which raises a bottom plate 7 to fixed height is repeated.

[0027] As mentioned above, since the bottom plate 7 of a paper tray 3 can be raised using the feed motor 15 which drives a feed roller, structure can be simplified and a cost cut can be aimed at.

[0028] In addition, although structure was used so that a power transfer path might be changed by rocking actuation of a swinging arm 19 when rotation of the one direction of the feed motor 15 was transmitted to a feed roller and rotation of the other directions was transmitted to the delivery screw 8 Two one-way clutches with which the rotation transfer directions differ, respectively in the gear

train driven on the feed motor 15 in which forward inverse rotation is free are prepared. Rotation of the one direction of the feed motor 15 is transmitted to a feed roller through one one-way clutch, and you may make it transmit rotation of the other directions of the feed motor 15 to the delivery screw 8 through the one-way clutch of another side.

[0029]

[Effect of the Invention] the paper tray which is contained free [a drawer] by the body of image formation equipment according to invention according to claim 1 -- many -- with the bottom plate loading the paper leaf of several sheets which can be gone up and down The delivery screw which has a follower gear in a part and was screwed in it at right angles to said bottom plate, and the body of revolution which is interlocked with drawer insertion actuation of said paper tray, and is rotated, The one direction rotation means of communication which transmits the turning effort of the one direction of said body of revolution accompanying drawer actuation of said paper tray to said delivery screw as a turning effort for dropping said bottom plate is formed. Since the driving means which contains in said body of image formation equipment the drive gear which drives said follower gear was established, the turning effort to the one direction of the body of revolution interlocked with drawer actuation of the paper tray from the body of image formation equipment Since it is transmitted to a delivery screw by the one direction rotation means of communication, the bottom plate in which the delivery screw was screwed can be dropped. Moreover, since the turning effort to the other directions of the body of revolution interlocked with insertion actuation of the paper tray to the body of image formation equipment is not transmitted to a delivery screw, where a paper tray is inserted in the body of image formation equipment, it can locate a bottom plate in the maximum downward location, can rotate a delivery screw by the driving means, and can raise a bottom plate. Therefore, since it may shift to the supply activity of paper leaf while a bottom plate can be dropped to the maximum downward location by the easy actuation which pulls out a paper tray and a paper tray is pulled out, paper leaf can be supplied in a short time.

[0030] Since the rolling gear which rolls the rack top prepared in the body of image formation equipment as body of revolution was used according to invention according to claim 2, flattery rotation of the body of revolution can be certainly carried out to drawer actuation of a paper tray, and a bottom plate can be certainly dropped to the maximum downward location.

[0031] According to invention according to claim 3, the one direction rotation means of communication which connects a delivery screw and body of revolution can maintain between the body of revolution and the delivery screws which rotate still more to a power cut off state, when the paper tray was pulled out to the middle and a bottom plate arrives at the maximum downward location, since it has the torque limiter. When the unusual force is applied to a bottom plate or a delivery screw by this, failure can be prevented beforehand.

[0032] According to invention according to claim 4, the driving means containing the drive gear which drives the follower gear of a delivery screw In order to make into a driving source the feed motor which rotates a drive gear in the direction which a feed roller is driven [direction] in the feed direction by rotation of an one direction, and raises a bottom plate by rotation of the other directions and in which forward inverse rotation is free, A bottom plate can be raised using the feed motor which drives a feed roller, and, thereby, simplification and a cost cut of structure can be aimed at.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the vertical section side elevation showing one example of this invention.

[Drawing 2] They are some horizontal sectional views showing the drive structure of the follower gear of a delivery screw, and a rolling gear.

[Drawing 3] They are some vertical section side elevations showing the drive structure of the follower gear of a delivery screw.

[Drawing 4] It is the top view showing a driving means.

[Drawing 5] It is the vertical section side elevation showing a driving means.

[Drawing 6] It is the horizontal sectional view showing drawer actuation of the paper tray from the body of image formation equipment.

[Drawing 7] It is the vertical section side elevation showing downward actuation of the bottom plate accompanying drawer actuation of a paper tray.

[Description of Notations]

2 Body of Image Formation Equipment

3 Paper Tray

4 Rack

6 Paper Leaf

7 Bottom Plate

8 Delivery Screw

9 Follower Gear

11 Body of Revolution, Rolling Gear

12 One Direction Rotation Means of Communication

14 Driving Means

15 Feed Motor

25 Drive Gear

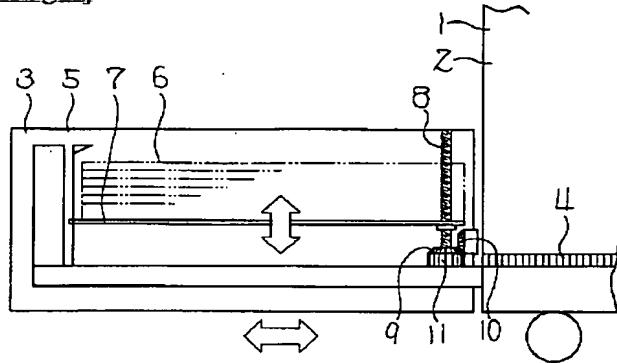
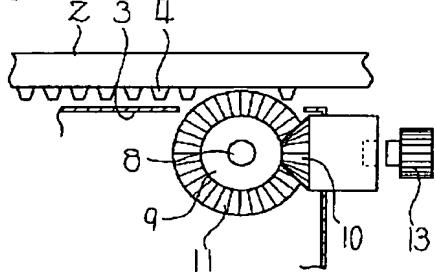
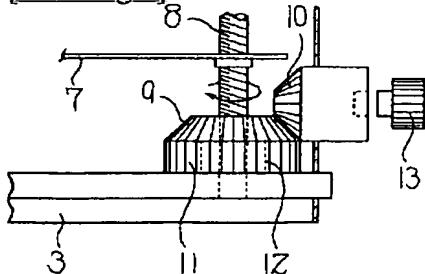
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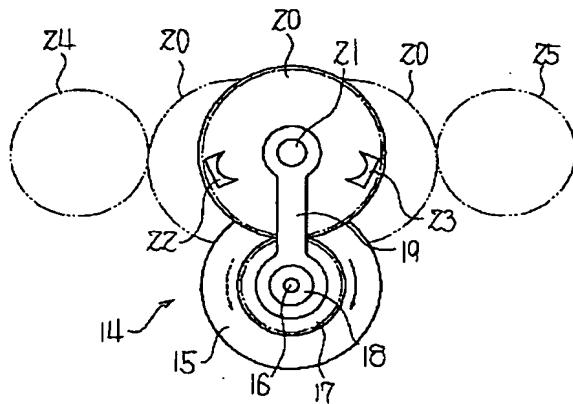
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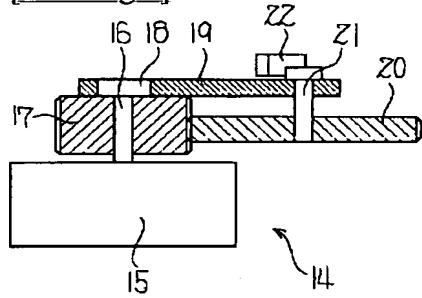
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DRAWINGS

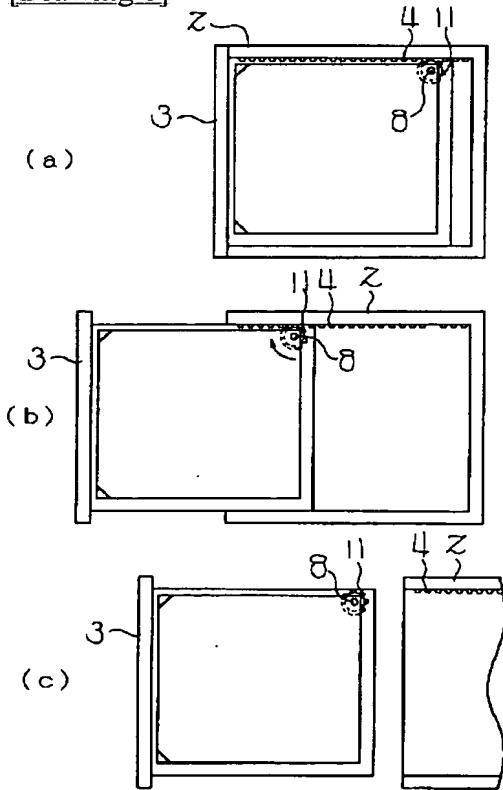
[Drawing 1]**[Drawing 2]****[Drawing 3]****[Drawing 4]**



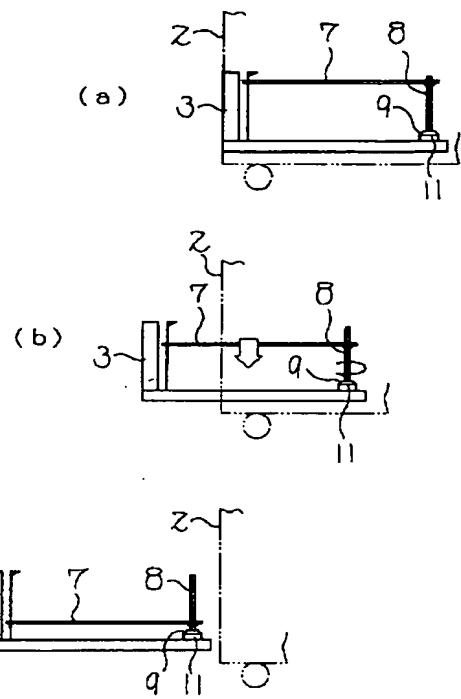
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Translation done.]